

Analysis of the Daniel Island West Wharf Alignment Final Draft

The South Carolina State Ports Authority (SPA) plans to build a new container terminal on the southern tip of Daniel Island. As part of this plan, the SPA intends to construct a wharf that is parallel to and 125 feet eastward from the eastern limits of the authorized Federal navigation channel on the Cooper River. The 125-foot setback represents the minimum berthing width that is needed to accommodate the ships that will be served by the wharf. Use of the minimum setback is expected to minimize both the initial dredging and life cycle maintenance costs of the berth.

The models that were used to design the Federal navigation channel that is now under construction indicate that the existing channel in the Daniel Island Reach is not wide enough and is not properly aligned to accommodate the ships that are expected to use it. In the design analysis, various modified channels were tested to estimate the shoaling, hydrodynamics, and navigability associated with differing channel widths and alignments.

The purpose of these studies was to design a channel that would safely accommodate the expected ship traffic without excessive maintenance costs or negative environmental impacts. Initial model runs show that widening the Daniel Island Reach could greatly increase maintenance costs. For this reason, contraction dikes were added to the designs and were found to greatly reduce predicted shoaling.

The proposed location of the wharf was based, in part, on this analysis. While the responsibility for siting the wharf is the SPA's, joint efforts were made to optimize the location of the wharf because the location of the wharf can effect shoaling and therefore the cost of maintaining the Federal channel. Each test scenario included a wharf that was 125 feet from the channel that was being tested. When the channel width and alignment were changed, the position of the wharf was also changed to maintain the 125-foot setback. Thus, as the width and alignment of the Federal channel were optimized with respect to what are in this case the competing demands of maintenance costs and navigability, the wharf alignment was also optimized.

Selected passages from the Charleston Harbor Deepening & Widening Feasibility Report, dated February 1996, illustrate the relationship between the Corps studies and the SPA's selection of the currently planned wharf alignment (emphasis added):

The SPA plans to construct a new commercial container terminal on the Cooper River side of Daniel Island. This terminal will be 7000 feet long with seven 1000-foot berths. The construction of this terminal will further complicate the existing conditions in this reach. Construction of this terminal presented a challenge to provide safe navigation for vessels transiting the waterway as well as protection of docked vessels at the new and existing facilities. A design team consisting of personnel from SPA, WES, District, Division, and Harbor Pilots Association developed various channel design plans. The initial proposed terminal location placed the face of the wharf within 125 feet of the existing Federal channel. This proposal was discarded by the design team after initial simulation runs because of concerns that the plan would add to the existing navigation problems. The location of the southwest corner of the terminal inhibited the vessels turn from Myers Bend to Daniel Island Reach thus forcing the vessels too close to tankers at the petroleum

pier. Several design plan alternatives were tested on the ship simulation model before consensus was reached by the design team resulting in the recommended plan described in this report. All tests revealed channel modification was required on the east side of the channel. The overall channel dimensions could have been reduced on the west side of the channel if not for the location of the petroleum pier.

The recommended widened channel would provide safe conditions for the 950-foot design vessels within the reach while allowing adequate clearance between moored vessels at the petroleum pier and new container terminal. The increase in commercial vessels size and number combined with existing and future navigational obstacles in the Daniel Island Reach warrant a wider channel based on navigational safety. [Section 3: Plan Formulation, pp. 28-28a]

The design of this channel accounts for the existing and projected physical features associated with the Daniel Island Reach. The wider channel is needed even without the construction of other harbor improvements analyzed on this study to provide safe navigation for size of the existing and projected commercial vessels utilizing Charleston Harbor. The new terminal is located in the most optimum location for safe navigation while allowing for efficient terminal operation as determined by ship simulations conducted at the Waterways Experiments Station. The terminal could not be moved any closer to the existing channel without compromising the safety of large commercial vessels traversing the bends around Daniel Island and that of ships docked at the Daniel Island Terminal. The west side of the Daniel Island channel remains in place to accommodate petroleum tankers calling on the Allied pier.

When the Daniel Island container terminal is constructed, there may be problems with channel alignment, stresses caused by passing ships on moored vessels, delays in getting vessels turned or other issues of navigation efficiency or safety that need to be addressed. [Section 3: Plan Formulation, pp. 29-30]

The Daniel Island Reach was investigated for widening primarily to facilitate the needs of the new container terminal along the Cooper River on Daniel Island. Various channel alignments were considered for optimum use of the new port facility and navigation considerations. The SCSPA and the Corps worked together to design the layout of the terminal in relationship with the channel and current flow patterns. The terminal will generate a dramatic increase in vessel congestion within the reach as a turning basin and seven-berth terminal is introduced. Two-way channel traffic combined with docked vessels at the new terminal and Allied Pier, and turning vessels in the basin add to the complexity of a reach located immediately up river of a difficult navigational bend and two protruding 700-foot long training dikes. [Section 4: Comparison of Alternative Plans, p. 41]

Having designed a channel that will safely accommodate the expected ship traffic without excessive maintenance costs, it is undesirable to depart from this design. Increasing the setback of the wharf will in effect create a wider channel, which is likely to undermine the gains that were made in reducing the volume of shoaling and the cost of maintaining this reach of the Federal channel.